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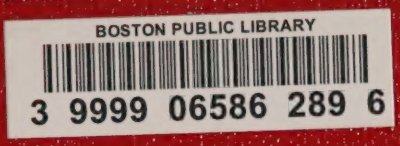

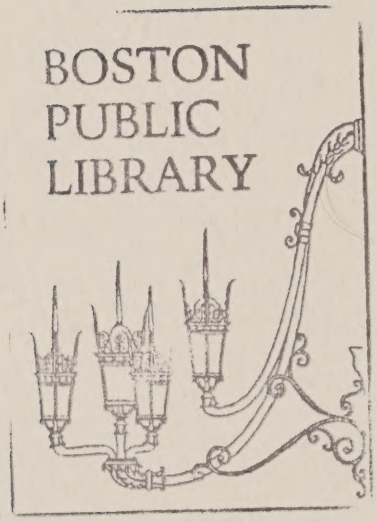
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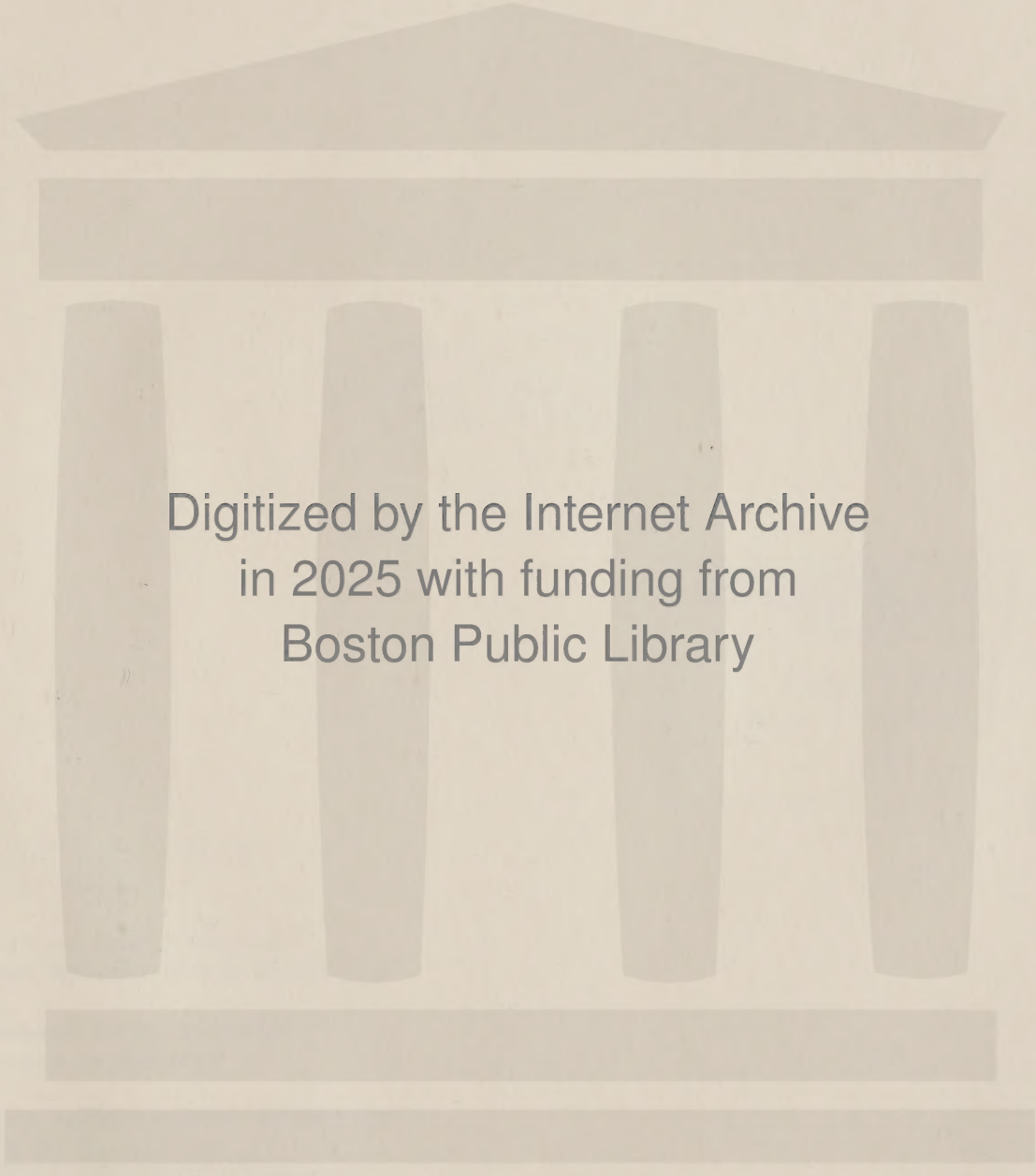
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POPULATION PROJECTIONS FOR BOSTON BY AGE GROUP AND FIVE-YEAR INTERVALS, 1980 TO 2000

Margaret C. O'Brien

Boston Redevelopment Authority
Research Department

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The population of the City of Boston is expected to grow during the last twenty years of this century. The combined forces of large cohorts of young home seekers, the increased popularity of urban living, the large number of two-worker households, the climbing cost of energy both for transportation and home heating, and the recent downturn in housing starts in the Boston area will place a heavy demand on available City housing. If the expected rate of growth in housing units between 1970 and 1985 is maintained through the year 2000, the population will grow despite smaller numbers of persons living in each household.

This report presents nine cohort population projections through 2000 A.D. developed from three migration assumptions (A, B, and C) and three fertility assumptions (High, Medium, and Low). Recently favorable migration rates for Boston, seen among young adult groups especially, are expected to evolve in various ways. Series A assumes that estimated levels of current net migration remain unchanged during the next twenty years. Series B is structured so that these same migration rates remain in force for young adults until the housing squeeze might ease after 1990. Also marginally larger percentages of those 35 years of age and older are expected to remain in Boston. In Series C, the attractive power of the City is expected to increase for most of the age distribution until 1990 and then wane for certain age groups thereafter. The three fertility assumptions for Boston are keyed to expectations for U.S. high, medium, and low fertility, based on the relationship of City to national fertility in the past.

Table 1 shows projections for the year 2000, with 1960 and 1970 population totals for comparison. Seven of the nine projections show an

increase from 1970, with one exceeding the 1960 total. The range is from 622,000 to 700,000. Series C is about 18,000 higher than Series B, while Series B exceeds Series A by 15,000 or so. Therefore, the difference between Series A and Series C attributable to migration is close to 34,000 or five percent in each fertility series. Within each Migration Series, there is a seven to eight percent, or near 45,000 difference between the High and Low Fertility options. The Medium and Low Fertility assumptions seem more probable given the past performance of Boston relative to the United States as a whole.

Therefore, the outlook is for stabilization or modest growth throughout the remainder of this century. Annual change would probably be in the vicinity of a tenth of a percent.

Table 1. Population of the City of Boston: Actual, 1960 and 1970, and Projected for 2000 A.D.

Fertility	1960	1970	2000 Migration Series		
			A	B	C
High			665,201	681,368	699,872
Medium	697,197	641,071	642,829	659,161	677,173
Low			622,471	636,681	653,945
Percent Change per Annum from Previous Timepoint					
High			+0.13	+0.21	+0.31
Medium	-	-0.81	+0.01	+0.09	+0.19
Low			-0.10	-0.02	+0.07

Table 2 indicates the projected population totals for the years between 1970 and 2000. The difference between the various projection series widen as the various migration and fertility assumptions are applied over time. This occurs most dramatically in the 1995-2000 period when the initial fertility differences of the 1975-1980 period are compounded by their entry into the age group 15-19 years, an age group subject to both high inmigration rates and the probability of childbearing.

Table 2. Total Population of City of Boston, Actual and Projected through the Year 2000

Year and Fertility Assumption	Migration Series A	B	C
1960		697,197*	
1970		641,071*	
1975		639,375	
1980			
High		644,650	
Medium		643,699	
Low		642,154	
1985			
High	657,015	661,109	661,920
Medium	651,914	655,977	656,731
Low	646,690	650,725	651,421
1990			
High	663,592	672,215	678,356
Medium	653,405	661,918	667,838
Low	642,849	651,252	656,940
1995			
High	663,840	675,889	688,036
Medium	648,718	660,574	672,209
Low	632,738	644,396	655,491
2000			
High	665,201	681,368	699,872
Medium	643,216	659,161	677,173
Low	622,471	636,681	653,945

* United States Bureau of the Census, Decennial Censuses of 1960 and 1970.

The age distribution of Boston's population as well as the population totals will change during this time period. Table 3 indicates that the overall effect of successive waves of high and low fertility, e.g., the Depression Dent, Baby Boom, and Birth Dearth of the past and recent years, will be an increase in the percentage of adults over 35 years of age, a stabilization of young adults and a decline in those under 15 years old from 1970 proportions. While the numbers vary somewhat among the three series, the overall impact will be a shift toward an older population. The median age would increase by some six years, on average for Series B, which has a slightly older age distribution than Series A or C.

However, an examination of the projections for the time points between 1970 and 2000 indicates somewhat more complex trends than simple loss, stabilization, and growth. Tables 4, 5, and 6 provide information for young, middle-aged and older adults between 1970 and 2000. The number of young adults, aged 20-34 years, is expected to peak in 1985 at 175,000, registering a near 35 percent increase over 1970 figures. In the following fifteen years, Table 4 shows this age group will have decreased by close to 20 percent. Thus, a large rise and fall in the numbers of young adults is expected before they again approach the 1970 level.

Our projections show that a substantial decrease (13 percent or 25,000 persons) in middle-aged adults during the 1970s will be reversed during the years 1980 to 2000. Both the large numbers of the post-World War II Baby Boom cohort and their inclination toward urban living are likely to produce large increases, 30 percent or more, in this age group by the end of the century. The rate of increase is expected to be especially high between 1985 and 1995 when alternative housing opportunities may be scarce.

Table 3. Age Distribution of Actual and Projected Population of the City of Boston: 1960, 1970, and 2000

Fertility and Age	1960	1970	2000 Migration Series A	2000 Migration Series B	2000 Migration Series C
High			665,201	682,368	699,872
0-14			147,885	151,240	157,161
15-34			224,424	225,482	234,765
35 and over			292,892	305,646	307,946
Medium	697,197	641,071	643,216	659,161	677,173
0-14	171,569	152,692	131,574	133,739	140,355
15-34	195,288	217,561	218,750	219,776	228,872
35 and over	330,340	270,818	292,892	305,646	307,946
Low			622,471	636,681	653,945
0-14			116,926	117,384	123,456
15-34			212,653	213,651	222,543
35 and over			292,892	305,646	307,946
Percent Distribution					
High			100.0	100.0	100.0
0-14			22.2	22.2	22.5
15-34			33.7	33.0	33.5
35 and over			44.0	44.8	44.0
Medium	100.0	100.0	100.0	100.0	100.0
0-14	24.7	23.9	20.5	20.3	20.7
15-34	28.0	33.9	34.0	33.3	33.8
35 and over	47.3	42.2	45.5	46.4	45.5
Low			100.0	100.0	100.0
0-14			18.8	18.4	18.9
15-34			34.2	33.6	34.0
35 and over			47.1	48.0	47.1

Table 4. Number of Persons 20 to 34 Years of Age in 1970, 1985, and 2000, with Percent Change

Migration and Fertility Alternatives	1970 Actual	Percent Change	1985 Projected	Percent Change	2000 Projected
Series A					
High Fertility				-20.4	166,554
Medium Fertility		33.7	209,254	-21.0	165,209
Low Fertility				-22.1	163,028
Series B					
High Fertility				-20.6	167,189
Medium Fertility	156,497	34.5	210,547	-21.2	165,844
Low Fertility				-22.3	163,663
Series C					
High Fertility				-17.8	174,583
Medium Fertility		35.7	212,338	-18.4	173,193
Low Fertility				-19.5	170,934

Table 5. Projected Changes in the Population 35-64 Years of Age through the Year 2000

Year	Number of Persons			Percent Change		
	A	B	C	A	B	C
1970		189,059				
					-9.4	
1975		171,255				
					-4.4	
1980		163,781				
				6.7	8.0	6.7
1985	174,753	176,958	174,753			
				8.2	9.5	10.4
1990	189,128	193,810	192,985			
				8.6	9.9	10.8
1995	205,398	212,915	213,897			
				7.3	9.0	9.8
2000	220,474	232,084	234,885			

Table 6. Projected Changes in the Population 65 Years and Older through the Year 2000

Year	Number of Persons			Percent Change		
	A	B	C	A	B	C
1970		81,759				
					6.5	
1975		87,072				
					2.3	
1980		89,097				
				-1.0	-0.8	-1.0
1985	88,189	88,371	88,189			
				-3.6	-3.2	-3.4
1990	85,035	85,549	85,210			
				-6.3	-5.8	-5.9
1995	79,681	80,585	80,149			
				-9.1	-8.7	-8.8
2000	72,418	73,562	73,061			

Meanwhile, the numbers of retired and elderly persons should fall somewhat during the remainder of this century. By the year 2000, those 65 years and over will have decreased by almost 20 percent from their 1980 peak of 89,000. An important factor in this decline is the relatively small number of middle-aged persons currently resident in Boston. The great exodus to the suburbs which occurred twenty to thirty years ago depleted the cohort of Bostonians born during the 1920s. The smaller cohort of the 1930s and continued suburban outmigration combined to limit the number of Bostonians who will turn 65 years old during the 1990s. In a sense, Boston has already lost a large proportion of its future elderly to the suburbs. Unlesss there is a dramatic shift in migration, bringing the prodigals back to the City, the numbers of elderly will be substantially smaller.

At the other end of the age spectrum, those under twenty will be subject to the movements of fertility rates, as well as those of migration.

The fertility assumptions used here are keyed to anticipated national trends. Migration rates are assumed to be fairly stable through time. Therefore, the number of births tends to be higher during the 1980s than during the 1970s and then drop off through the 1990s. This is due to an anticipated swell in both fertility rates and numbers of women of childbearing age through the 1980s and parallel ebbs thereafter.

The trends in numbers in the age groups under twenty years, seen in Tables 7, 8, 9, and 10, are largely determined by these fertility patterns over time. Those under five years increase in the 1980s and decrease again in the 1990s as births expand and contract. For the age group 5-9 years, the expansion and contraction comes five years later. The Baby Boom Echo is not seen among 10-14 year olds until the 1990s. The 15-19 year old group contracts during the 1980s but increases again during the 1990s. While young people will still be attracted to Boston's educational and cultural institutions, job opportunities and livable scale, it is unlikely that numbers of immigrant college age students, who would be part of the post-Baby Boom smaller birth cohorts, could offset the sizable reduction expected for Boston's late adolescents during the 1980s. Therefore, there will probably be a substantial decrease in numbers of 15-19 year olds, and a subsequent increase in the 1990s.

The overall picture for the years between 1970 and 2000 is for change in the share that various age groups form of the population total. The largest changes will be the expansion of the productive ages, especially those 25-44 years old, followed by a slight contraction, and the shrinkage of the dependent age groups, roughly those under fifteen years and those 65 years and older.

Table 7. Population of Boston by Age Groups, Actual in 1970 and Estimated in 1975 and 1980

Age Group		1970	1975	1980
	I			644,650
All ages	II	641,071	639,375	643,699
	III			642,154
	I			45,330
Under 5 years	II	49,927	41,585	44,378
	III			42,834
5-9 years		51,707	44,774	37,343
10-14 years		51,058	46,915	41,640
15-19 years		61,064	60,811	59,301
20-24 years		77,118	80,864	81,318
25-29 years		47,925	67,455	70,710
30-34 years		31,454	38,645	56,130
35-39 years		29,108	28,007	34,750
40-44 years		31,627	26,190	25,203
45-49 years		32,806	28,713	23,932
50-54 years		32,667	29,951	26,214
55-59 years		32,096	29,588	27,128
60-64 years		30,755	28,806	26,554
65-69 years		26,891	26,603	25,519
70-74 years		22,578	22,839	22,594
75-79 years		15,933	18,315	18,527
80 years and over		16,357	19,315	22,457

Table 8. Projected Population of Boston by Age Groups, Series A: 1985, 1990, 1995, 2000

Age Group and Fertility Series	Series A			
	1985	1990	1995	2000
All ages, I	657,015	663,592	663,840	665,201
II	651,914	653,405	648,718	643,216
III	646,690	642,849	632,738	622,471
Under 5 years I	56,752	57,805	53,637	51,444
II	52,506	52,227	48,076	44,785
III	48,668	46,406	42,158	38,859
5-9 years I	40,706	50,963	51,909	48,166
II	39,851	47,150	46,900	43,172
III	38,465	43,704	41,673	37,858
10-14 years I		37,857	47,396	48,275
II	34,729	37,061	43,850	43,617
III		35,772	40,645	40,209
15-19 years I			47,853	57,870
II	52,632	43,900	46,847	53,541
III			45,217	49,625
20-24 years I				63,993
II	79,302	70,382	58,707	62,648
III				60,467
25-29 years	71,109	69,347	61,548	51,339
30-34 years	58,843	59,175	57,711	51,222
35-39 years	50,476	52,918	53,219	51,903
40-44 years	31,267	45,426	47,625	47,901
45-49 years	23,038	28,587	41,541	43,566
50-54 years	21,854	21,046	26,124	37,973
55-59 years	23,753	19,809	19,083	21,965
60-64 years	24,365	21,342	17,806	17,166
65-69 years	23,555	21,625	18,953	15,822
70-74 years	21,709	20,063	18,431	16,166
75-79 years	18,382	17,681	16,370	15,201
80 years and over	24,543	25,666	25,927	25,229

Table 9. Projected Population of Boston by Age Groups, Series B: 1985, 1990, 1995, 2000

Age Group and Fertility Series	Series B			
	1985	1990	1995	2000
All ages I	661,109	672,215	675,889	682,368
II	655,977	661,918	660,574	659,161
III	650,725	650,252	644,396	636,681
Under 5 years I	57,166	58,652	54,550	52,272
II	52,889	52,992	48,896	45,574
III	49,023	47,086	42,880	39,555
5-9 years I	40,706	51,335	52,669	49,986
II	39,851	47,494	47,587	43,909
III	38,465	44,023	42,283	38,506
10-14 years I		37,857	47,742	48,982
II	34,729	37,061	44,169	44,256
III		35,772	40,941	39,323
15-19 years I			47,853	58,293
II	52,632	44,217	46,847	53,932
III			45,217	49,988
20-24 years I				63,993
II	79,302	70,382	59,130	62,648
III				60,467
25-29 years	71,837	70,059	61,863	51,710
30-34 years	59,408	60,354	58,582	51,486
35-39 years	51,473	54,480	55,350	53,729
40-44 years	31,570	46,772	49,508	50,302
45-49 years	23,263	29,146	43,189	45,719
50-54 years	22,067	21,458	26,893	39,862
55-59 years	23,984	20,196	19,646	24,629
60-64 years	24,601	21,758	18,329	17,843
65-69 years	23,555	21,834	19,322	16,287
70-74 years	21,709	20,063	18,610	16,480
75-79 years	18,564	17,856	16,533	15,349
80 years and over	24,543	25,796	26,120	25,446

Table 10. Projected Population of Boston by Age Groups, Series C: 1985, 1990, 1995, 2000

Age Group and Fertility Series	Series C			
	1985	1990	1995	2000
All ages I	661,920	678,356	688,036	699,872
II	656,731	667,838	672,209	677,173
III	651,421	656,940	655,491	653,945
Under 5 years I	57,813	59,935	56,540	54,780
II	53,487	54,151	50,680	48,220
III	49,578	48,116	44,445	42,121
5-9 years I	41,114	52,436	54,361	51,282
II	40,251	48,513	49,115	45,967
III	38,850	44,967	43,641	40,312
10-14 years I		38,647	49,290	51,099
II	35,102	37,836	45,602	46,168
III		36,519	42,269	41,023
15-19 years I			49,206	60,182
II	52,632	44,692	48,173	55,679
III			46,497	51,609
20-24 years I				66,265
II	79,302	70,913	60,186	64,875
III				62,616
25-29 years	72,567	71,482	63,919	54,254
30-34 years	60,469	62,056	60,488	54,064
35-39 years	50,476	55,454	56,912	55,475
40-44 years	31,267	45,865	50,391	51,722
45-49 years	23,038	28,866	42,352	46,535
50-54 years	21,854	21,250	26,635	39,090
55-59 years	23,753	20,001	19,455	24,393
60-64 years	24,365	21,549	18,152	17,670
65-69 years	23,555	21,624	19,136	16,129
70-74 years	21,709	20,064	18,430	16,322
75-79 years	18,382	17,856	16,533	15,200
80 years and over	24,543	25,666	26,050	25,410

These changes in Boston's population are consistent with anticipated changes in other areas. Boston has opportunities to gain as many as 80,000 jobs in the decade of the 1980s.* If the City were to achieve the goal of capturing fifty percent of these jobs for its workers, there would be 40,000 net, new, Boston resident-held jobs. Rough calculations indicate that 30,000-50,000 net new jobs would be required by the projected number of residents here, depending on participation rates.

The number of housing units in the City is expected to grow also. The net additions of 13,000, 11,000, and 10,000 units to the housing stock during the 1970s, 1980s, and 1990s respectively, should bring the total number of units in Boston to 267,000**. This represents a fifteen percent increase in the number of housing units compared to 1970. The current, coordinated City planning efforts have and are providing a sound basis for the realization of these goals.

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* "Planning for Boston's Next Decade of Development, 1980-90", Research Department, Boston Redevelopment Authority (Draft).

** Projections of housing units by Rolf Goetze.

Methodology

These population projections were prepared using the cohort component method. In this method, the 1970 population was divided into five-year age groups. Each age group was then successively aged five years at a time by the application of age-sex-time period appropriate survival* and net migration rates for each of the five-year intervals between 1970 and 2000 (Table 11). The net migration rates were developed from the intercensal rates for the 1950-60 and 1960-70 decades, and the 1965 to 1970 rates.**

For the childbearing years, the female population, 15-44 years old, is first estimated (Table 12). Then the males are estimated by application of the sex ratios (Table 13) for each age group. The males and females are then added together to give the total population. The females in these age groups are then subjected to the risk of fertility by the application of period appropriate general fertility rates (Table 14). These fertility rates are developed from the expected national general fertility rates for future years.

The births that result from the application of the general fertility rates to females of childbearing age are then survived and adjusted for migration to yield the youngest age group, those less than five years old. Children through the age of 14 are subject to combined survival/migration rates (Table 11).

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* U.S. Bureau of the Census, "Projections of the Population of the United States", Current Population Reports, Series P-25, No. 704, Table B-1.

** U.S. Bureau of the Census, Current Population Reports, P-25, No. 701, "Gross Migration by County: 1965-1970", May 1977.

Table 11. Projected Net Migration Rates for Five-Year Age Groups, Series A, B, C, through the Year 2000

Age Groups, Migration Series	Time Period					
	1970-75	1975-80	1980-85	1985-90	1990-95	1995-2000
Births to 0-4 yrs **						
A,B	.887	.900	.900	.900	.900	.900
C	.887	.900	.909	.909	.909	.909
0-4 to 5-9**						
A,B	.898	.898	.898	.898	.898	.898
C	.898	.898	.907	.907	.907	.907
5-9 to 10-14**						
A,B	.908	.930	.930	.930	.930	.930
C	.908	.930	.940	.940	.940	.940
10-14 to 15-19*						
A	1.300	1.380	1.380	1.380	1.380	1.380
B	1.300	1.380	1.380	1.390	1.380	1.333
C	1.300	1.380	1.380	1.390	1.390	1.333
15-19 to 20-24*						
A,B	1.406	1.420	1.420	1.420	1.420	1.420
C	1.406	1.420	1.420	1.430	1.430	1.430
20-24 to 25-29*						
A	.780	.780	.780	.780	.780	.780
B	.780	.780	.788	.788	.784	.780
C	.780	.780	.796	.804	.804	.804
25-29 to 30-34*						
A	.807	.833	.833	.833	.833	.833
B	.807	.833	.841	.841	.837	.833
C	.807	.833	.856	.856	.847	.847
30-34 to 35-39*						
A	.902	.911	.911	.911	.911	.911
B	.902	.911	.929	.929	.929	.929
C	.902	.911	.911	.929	.929	.929
35-39 to 40-44*						
A	.928	.928	.928	.928	.928	.928
B	.928	.928	.937	.937	.937	.937
C	.928	.928	.928	.937	.937	.937
40-44 to 45-49**						
A	.917	.923	.923	.923	.923	.923
B	.917	.923	.932	.932	.932	.932
C	.917	.923	.923	.932	.932	.932
45-49 to 50-54**						
A	.927	.927	.927	.927	.927	.927
B	.927	.927	.936	.936	.936	.936
C	.927	.927	.927	.936	.936	.936

Table 11 (cont.)

Age Groups, Migration Series	1970-75	1975-80	1980-85	1985-90	1990-95	1995-2000
50-54 to 55-59**						
A	.927	.927	.927	.927	.927	.927
B	.927	.927	.936	.936	.936	.936
C	.927	.927	.927	.936	.936	.936
55-59 to 60-64**						
A	.930	.930	.930	.930	.930	.930
B	.930	.930	.939	.939	.939	.939
C	.930	.930	.930	.939	.939	.939
60-64 to 65-69**						
A,B,C	.912	.934	.934	.934	.934	.934
65-69 to 70-74**						
A,B,C	.917	.917	.917	.917	.917	.917
70-74 to 75-79**						
A	.908	.908	.908	.908	.908	.908
B	.908	.908	.917	.917	.917	.917
C	.908	.908	.908	.917	.917	.917
75-79 to 80-84**						
A,B,C	1.004	1.004	1.004	1.004	1.004	1.004
80-84 to 85 and over**						
A,B,C	1.006	1.006	1.006	1.006	1.006	1.006

* Females
** Both sexes

Table 12. Actual and Projected Numbers of Women of Childbearing Age (15-44 years) at Five-Year Intervals: 1970 to 2000

Year and Fertility Series	Women of Childbearing Age		
	Migration Series		
	A	B	C
1970		148,378	
1975		160,502	
1980		173,841	
1985	181,462	182,786	183,024
1990	179,658	182,292	184,434
1995 High	171,750	174,671	179,252
1995 Medium	171,210	174,131	178,698
1995 Low	170,335	173,256	177,798
2000 High	171,138	173,892	180,432
2000 Medium	167,828	170,785	178,909
2000 Low	164,485	167,427	176,525

Table 13. 1970 Sex Ratios by Age Group

Age Groups	Males/Females
10-14 years	1.032
15-19 years	.863
20-24 years	.757
25-29 years	.973
30-34 years	.975
35-39 years	.955
40-44 years	.904

Table 14. Current and Projected General Fertility Rates and Births for Boston

General Fertility Rates	1970-75	1975-80	1980-85	1985-90	1990-95	1995-2000
United States						
High		74.5	88.0	90.5	87.8	83.5
Medium	74.2	66.8	72.5	71.6	68.6	65.2
Low		61.0	62.7	59.8	56.1	53.0
Boston						
High		58.1	69.5	71.5	69.4	66.8
Medium	58.0	56.8	64.3	64.6	62.4	59.3
Low		54.9	59.6	57.4	55.0	52.5
Births						
Boston						
Series A						
High			63,058	64,228	59,597	57,160
Medium	41,585*		58,340	58,030	53,418	49,761
Low			54,076	51,562	46,842	43,177
Series B						
High		45,252	63,518	65,169	60,611	58,080
Medium	41,585*	43,432	58,766	58,880	54,329	50,628
Low		41,785	54,470	52,318	47,645	43,950
Series C						
High			63,601	65,935	62,200	60,264
Medium	41,585*		58,842	59,572	55,754	53,047
Low			54,541	52,933	48,894	46,338

* Actual number of births.

As was explained above, three migration and three fertility assumptions are applied. They produce nine different series. While any of the nine are within the realm of possible futures for Boston, the lower fertility assumptions might better describe Boston's expectations for young children, given the past performance of Boston residents relative to the rest of the nation. Moreover, Migration Series A and B yield household sizes that are more in line with the nationally projected decline in household size*, while Series C assumes that household sizes remain relatively stable. These projections in conjunction with the probable number of future jobs and housing units indicate that the prospects for a stable and growing population of the City of Boston are strong.

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* George Masnick and Mary Jo Bane, The Nation's Families: 1960-1990 (Cambridge: Joint Center for Urban Studies of MIT and Harvard University, 1980).

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